CASE REPORTS

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Cardiomyopathy Secondary To Pheochromocytoma

FRED M. FAUVRE, M.D.,
DONALD R. JOHN, M.D.,
L. E. WATKINS, M.D., *Riverside*

MYOCARDITIS HAS BEEN PRODUCED experimentally by catecholamines since adrenalin was first synthesized in 1904, initial experiments having been done by Ziegler in 1905[1] and Pearce in 1906.[2] Not until Szakacs and Cannon[3] did so in 1958 had anyone described a specific focal myocarditis, indistinguishable from that produced by norepinephrine infusions, in association with human pheochromocytoma. Since then, there have been additional articles[4,5,6] reporting a total of 24 cases of myocarditis associated with pheochromocytoma.

The following is a report of a case of progressive, terminal myocarditis which at autopsy proved to be due to pheochromocytoma.

Report of a Case

The patient was a 47-year-old Caucasian man, who first became symptomatic in late November, 1970. He noticed gradual onset of dyspnea on exertion, and later hemoptysis. In December he was admitted at another hospital and transferred to Riverside General Hospital after three days. Pertinent medical history was of hypertension, treated with sodium butabarbital and reserpine (Butiserpine®) from 1963 until 1966 at which time he had been told he no longer needed medication. He said that he had had night sweats intermittently over several months before admission and he spoke of himself as a "nervous" person.

On initial admission, blood pressure, sitting, was 180/130 mm in both arms but was normal when taken subsequently and throughout most of his hospital stay. He was observed to be thin, in moderate respiratory distress, sweating mildly and quite anxious-appearing. The pulse rate was 112, with a prominent S_3 gallop. On examination of the lungs, decreased breath sounds and dullness to percussion posteriorly were noted. The liver was palpable 6 cm below the right costal margin, there was no ascites and no evidence of peripheral edema. An x-ray film of the chest

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Reprint requests to: F. M. Fauvre, M.D., 5634 Malvern Way, Riverside, Ca. 93506.

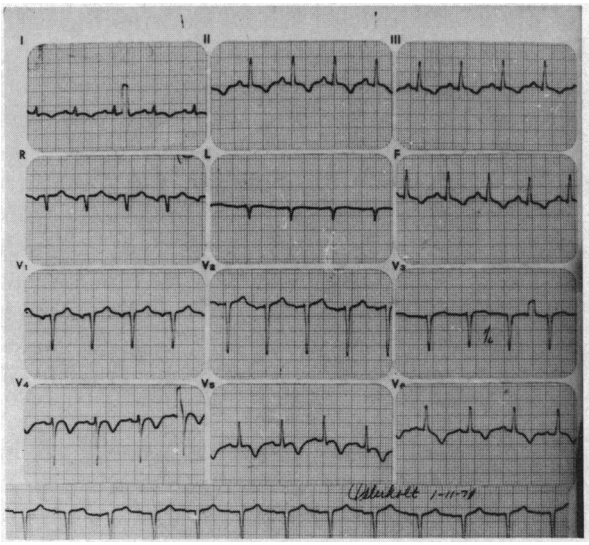

Figure 1.—EKG taken during first hospitalization, showing T wave inversion consistent with myocarditis.

showed bilateral pleural effusion, and thoracentesis on admission produced 1200 ml of fluid from each chest cavity. An electrocardiogram showed T wave inversion consistent with myocarditis (Figure 1). Cope needle biopsy of the pleura revealed chronic inflammation.

The patient was treated with digitalis and diuretics and bed rest on the chest ward for one month and his condition improved dramatically. Studies done at that time ruled out granulomatous disease.

The patient was discharged with the diagnosis of viral myocarditis, and regular visits to the cardiac clinic were scheduled. Limited activity at home was prescribed, but he did poorly at home, requiring frequent trips to the emergency room, and he was readmitted 27 May 1971 with progressive congestive failure. The patient responded dramatically to intravenous furosemide, and the next day was transferred to the ward. That night his temperature rose to 40.6°C (105°F), and he had hemoptysis, dyspnea and anxiety. No sources of possible embolic phenomena were evident on physical examination. He was treated with heparin, and morphine and oxygen also were given. Fluid withdrawn at thoracentesis done on admission was sterile; a sputum culture grew Staphylococcus aureus, coagulase positive, and cephalothin sodium (Keflin®) was given intravenously.

A lung scan showed a larger perfusion defect than the lesion on chest x-ray which was consistent with pulmonary embolus. The patient's condition deteriorated progressively until he died, 12 days later. During the last 48 hours he received dexamethasone, 8 mg by intravenous bolus followed by 4 mg intravenously every four hours for four doses. This was discontinued when guiac-positive material and a small amount of blood was aspirated from a nasogastric tube. The patient became progressively more lethargic and died June 6. At autopsy a 70-gram pheochromocytoma of the right adrenal and a large hemorrhagic area in the interventricular septum of the heart were observed (Figure 2). Multiple pulmonary emboli, source undetermined, and superficial ulceration of the stomach were also found. Sections from the hemorrhagic area in the interventricular septum of the heart showed extensive muscle necrosis without acute inflammatory response (Figure 3). There were areas where the muscle cells appeared to have ruptured, and be-

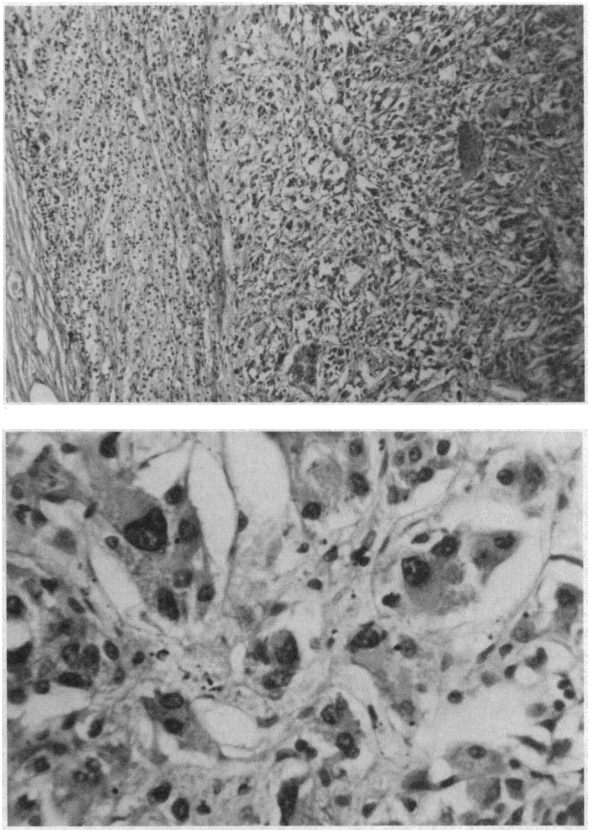

Figure 2.—*Upper*, low power view of pheochromocytoma showing the tumor on the right, and a thin layer of adrenal cortex covered by connective tissue on the left. The higher power view below shows large cells with abundant granular cytoplasm characteristic of adrenal medulla.

Figure 3.—Low and high power magnification of involved heart muscles, showing infiltration with chronic inflammatory cells, myocytolysis and scarring, characteristic of catecholamine myocarditis.

tween these cells was an amorphous blue-staining material. These changes were thought to be consistent with "myofibrillar degeneration."[7] In addition to the foci of necrosis and recent hemorrhage there were areas showing replacement of muscle fibers by loose connective tissue containing a few mononuclear inflammatory cells. These areas did not show the dense collagenous scar tissue typical of old myocardial infarcts, but were more typical of "myocytolysis."[8] Myocytolysis is thought to be a late stage of "myofibrillar degeneration" and both lesions are described in patients who die with pheochromocytoma.[4,7]

Discussion

Myocarditis was found in 58 percent of 26 patients with pheochromocytoma in a retrospective study by Van Vleit in 1966.[6] The histologic changes have been well characterized[7] and identical lesions have been produced experimentally by injections of catecholamines.[6] The diagnosis of pheochromocytoma can be made on the basis of urinary catecholamines and their metabolites even in the patient with congestive failure and diaphoresis,[9] but to date the majority of the reported pheochromocytomas have been diagnosed at autopsy.[10] Experiments with dog heart-lung preparations have shown that corticosteroids augment the cardiac muscle toxicity of catecholamines.[11,12] In the case here reported the patient received a short course of dexamethasone, which may have had a synergistic effect with the endogenous sympathomimetic hormone against his myocardium.

Pheochromocytoma should be considered in the differential diagnosis of myocarditis.

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